DRAFT
AIR QUALITY MANAGEMENT PLAN
1988 REVISION

ADDENDUM
DRAFT
APPENDIX IV—A
TIER I AND TIER II
CONTROL MEASURES

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AUGUST 1988

89 00303
Appendix IV -A
Addendum

DRAFT
AIR QUALITY MANAGEMENT PLAN
1988 REVISION

ADDENDUM
DRAFT
APPENDIX IV—A
TIER I AND TIER II
CONTROL MEASURES

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AUGUST 1988

LIST OF CONTRIBUTORS

Carolyn Green
Deputy Executive Officer/Planning and Analysis

Authors:

Planning Division

Ewing, Ken
Lieu, Sue
Moore, Lynne
Pirveysian, Zorik
Vensel, David

Compiled By:	David Vensel Zorik Pirveysian
Reviewed By:	Elaine Chang
Production By:	Lori Martinez Penny Shaw Elizabeth Torres Tina Russell

Preface

This addendum to Draft Appendix IV-A: Tier I and Tier II Control Measures is to:

1) provide additional information which became available after the appendix was published;

2) reflect comments received during the review period;

3) correct errors.

Information contained in this addendum is only that portion which has been revised or added to the existing control measures, or addition of new measures. These corrections and/or additions will be incorporated into the final draft of Appendix IV-A to be printed in full in December 1988.

Draft Appendix IV-A: Tier I and Tier II Control Measures
Addendum

GENERAL COMMENTS

1) For the purpose of clarity, the remaining emissions after implementation of a proposed control measure will be added to the summary table of each control measure in the final draft. For example, the summary table for Control Measure A-1: Wood Flatstock Coating would show the following:

Emissions:			
(Tons/Day)	*Year 1985*	*Year 2000*	*Year 2010*
ROG Inventory	*0.9*	*0.9*	*0.9*
ROG Reduction	---	*0.4*	*0.4*
ROG Remaining	---	*0.5*	*0.5*

2) For Early Action Plan Measures, the emission reductions and control costs were quoted from the latest District staff reports prepared for rulemaking purposes. The methods used in those staff reports to estimate emission inventory, emission reductions, and control costs were slightly different from the AQMP methods described in Appendix IV-A, and were usually more refined and detailed.

3) Several proposed control measures would increase the use of 1,1,1 trichloroethane (methyl chloroform). Knowledge developed in the past four or five years regarding the toxicity of this compound is summarized as follows:

Exposure to 1,1,1 trichloroethane (TCA) has been associated with adverse health effects at concentrations significantly higher than those which occur in ambient air (U.S. EPA, 1984). Acute effects involving disturbances in equilibrium are not likely until concentrations of 1000 ppm are reached (1 to 2 hours of exposure). Slight changes in perception and the obvious presence of an odor were reported among subjects exposed for less than four hours to a range of 350-500 ppm. Average concentrations in various portions of the Basin ranged from 1 to 7 ppb in 1985 (Shikiya et al. 1987).

The toxicity of TCA was reviewed by EPA and a Health Assessment Document for the compound was published in 1984. It was concluded that:

"The weight of available evidence obtained from both human and animal data suggest that long term exposure to environmental levels of [TCA] poses no serious health concern to the general population. No teratogenic [birth defects] potential has been demonstrated for [TCA] in studies conducted to date in rodent species. Available data are inadequate for reaching firm conclusions about its mutagenic potential in humans. Because of the limited usefulness of the animal bioassays conducted to date, it is not possible to classify [TCA] in regard to its carcinogenic potential in humans." (EPA, 1984)

In 1985 the EPA determined that information on methyl chloroform was not sufficient warrant regulation under the Clean Air Act. It was concluded that:

"..given the absence of information on adverse effects of [TCA] at or anywhere near concentrations found or anticipated in the ambient air, EPA has determined that it will not regulate [TCA] on the basis of direct health effects under the CAA [Clean Air Act] at this time. If studies underway or future studies indicate a potential for adverse health or environmental effects from emissions of [TCA] into the ambient air, EPA will consider further regulation of this substance at that time." (EPA, 1985)

One of the studies underway to which the agency referred was a carcinogenicity bioassay being conducted by the National Toxicology Program (NTP). This study was completed , but unfortunately, an audit of the study indicated that there were irregularities and the results will not be released as an NTP cancer bioassay. The results of the audit are being obtained by District staff. A repeat study is currently being designed, however, results will probably not be available for five years. Preliminary results from the first study indicated that if TCA was carcinogenic (and it is not clear that this the case) it was not a very potent one.

Another concern with methyl chloroform is its potential to deplete stratospheric ozone. This depletion could be associated with indirect health effects such as an increase in skin cancer. Although TCA has a fairly long lifetime in the atmosphere (5 -10 years) its potential for ozone depletion is only about one tenth that of chlorofluoro-carbons such as CFC-11 or CFC-12.

Pursuant to AB 1807, methyl chloroform was listed as a Level 1B pollutant in 1984. Level 1B pollutants are judged to be of concern based on the AB 1807 criteria but for which additional information is desired before a full health effects evaluation is needed. In February of 1988, ARB moved methyl chloroform down to Category III compounds. Category III compounds are those for which health effects information is limited or not yet sufficient to support a review. According to ARB, substances in this category are produced and emitted to the air in quantities which might make them of concern at such time as health effects information is strong enough to support a review (ARB, 1988).

References

ARB. 1988. Information Report on the Status of Toxic Air Contaminants, Air Resources Board, February 1988.

EPA. 1984. Health Assessment Document for 1,1,1-Trichloroethane (Methyl Chloroform). EPA-600/8-82-003F. February 1984.

EPA. 1984. "Assessment of Methyl Chloroform as a Potentially Toxic Air Pollutant", Federal Register, p. 24314, June 10, 1985.

Shikiya, M., Liu, C.S. Nelson, E.D.P., and Rapoport, R. The Magnitude of Ambient Air Toxics Impacts from Existing Sources in the South Coast Basin. Presented in AQMP Working Paper No. 3, June 1987.

REVISIONS TO APPENDIX IV-A CONTROL MEASURES

1) CM #88-A-2* — Further Emission Reductions from Manufactured Wood Furniture and Miscellaneous Wood Products

The proposed control measure to reduce ROG emissions from the manufacture of wood furniture and miscellaneous wood products was adopted on August 5, 1988 as Amended Rule 1136. Additional data collected during the rulemaking process indicates that reformulated coating products now offer a more viable control method and have been adopted as the primary control technique to achieve compliance with rule amendments. Add-on control devices will be available as an optional method to achieve emission level compliance. As a result of the adopted amendments to Rule 1136, a three-step emission reduction leading to an overall 93 percent reduction in emissions by 1996 is required, which is more stringent than the previously proposed 80 percent emission reduction. The cost effectiveness for this measure is estimated at a savings of $356 per ton of ROG reduced. The following table updates the emission reductions used in the Draft AQMP.

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	21.2	30.5	31.9
ROG Reduction	---	28.5	29.7
ROG Remaining	---	2.0	2.2

2) CM #88-A-4 — Further Emission Reductions from Aerospace Assembly and Component Coating

PROPOSED METHOD OF CONTROL

The proposed method of control for this measure has been expanded to include the reformulation of aerospace and component topcoats. Inclusion of this control approach will contribute an additional 5 percent to the emission reduction for this category, bringing the total reduction to 35 percent. The emission reductions are summarized in the table below:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	7.3	5.5	5.7
ROG Reduction	---	1.8	1.9
ROG Remaining	---	3.7	3.8

3) **CM #88-A-6* Substitute Solvents Used in Automobile Refinishing**

The proposed control measure was adopted as Rule 1151, "Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations", by the District Board on July 8, 1988. The rule requires the use of (1) lower VOC coatings; (2) high transfer efficiency application equipment; (3) lower VOC solvents for surface preparations; (4) totally enclosed systems for cleaning spray equipment; and (5) closed containers for storage and disposal of paper and cloth used for surface preparation and clean-up. An Alternative Emission Control Plan provision is provided for compliance by the use of add-on equipment, such as afterburners or carbon adsorbers. The Staff Report for Proposed Rule 1151 provided revised values for the emission inventory figures and an emissions reduction estimate of 87 percent as opposed to 95 percent originally estimated in the Draft AQMP. The overall cost effectiveness of the requirements of Rule 1151 at full implementation is estimated to be about $7,000 per ton of ROG reduced. This figure represents close to a worst case value. The following table updates the emissions inventory and emission reductions as presented in the Draft AQMP.

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	33.9	43.3	48.6
ROG Reduction	---	37.8	42.3
ROG Remaining	---	5.5	6.3

4) **CM #88-A-7* Substitute Solvents Used for Marine Vessel Coating**

EMISSIONS REDUCTION

The emissions inventory and emissions reduction sections are revised to reflect data made available from the Staff Report for Proposed Rule 1106 dated March 22, 1988. The revised emission inventory is lower than that originally estimated, and the emission reduction has been revised to 30 percent from about 40 percent. The following table updates these categories as presented in the Draft AQMP.

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	3.2	3.3	3.5
ROG Reduction	---	1.0	1.0
ROG Remaining	---	2.3	2.5

5) **CM #88-A-8** **Control of Emissions from Architectural Coatings**

The title of this control measure will be changed to "Emission Charges on Architectural Coatings"-CM #88-A-8b and an additional control measure will be added to Appendix IV-A entitled "Further Control of Emissions from Architectural Coatings", which will be numbered as CM #88-A-8a.

6) Control Measure #88-A-8a will be included in the Draft 1988 Revision of the AQMP as follows:

CM #88-A-8a (New Measure)

FURTHER CONTROL OF EMISSIONS FROM
ARCHITECTURAL COATINGS
[ROG]

****

Summary

Source Category: *Architectural Coatings*

Control Methods: *Delete Exemption, Low VOC or Waterborne Coatings*

Emissions:

(Tons/Day)	*Year 1985*	*Year 2000*	*Year 2010*
ROG Inventory	*63.8*	*44.0*	*49.7*
ROG Reduction	----	*11.0*	*12.4*
ROG Remaining	----	*33.0*	*37.3*

Control Cost: *Not Determined*

Other Impacts: *None*

****

DESCRIPTION OF SOURCE CATEGORY

Background

According to the 1985 emission inventory, architectural coatings accounted for 64 tons per day of reactive organic gas (ROG) emissions which were higher than any industrial coating processes. The small-scale and infrequent nature of architectural coating operations and the size of substrates make the installation of control equipment presently impractical. Unlike industrial coatings, emissions from architectural coatings are difficult to control by adding control equipment in the coating process. As a result, coating reformulation is currently being proposed to reduce ROG emissions from architectural coating applications.

The current available technology for architectural coatings is solvent-borne or water-borne. The extent to which various technology has been successfully applied depends on the type of coating, and the individual specifications. For example, there have been few water-borne lacquer products on the market, while non-flat coatings have been made available through water-borne technology. The newly-emerged reactive diluent technology will produce nearly zero emissions from volatile organic compounds (VOC) during the curing process because most of the VOC becomes an integral part of finished coatings through chemical reaction.

Regulatory History

Rule 1113 sets various VOC limits for different types of architectural coatings. However, these limits do not encourage further VOC reductions below the specified limits. Hence, continuous emission reductions will not occur unless more stringent limits are adopted.

PROPOSED METHOD OF CONTROL

The proposed method of control to reduce ROG emissions from architectural coating operations is to remove the current exemption in Rule 1113 for coatings sold in containers of one liter or less, as well as removal of the exemption for small business users, and to require the reformulation of architectural coatings.

Reformulation of architectural coatings with water or low solvent bases is expected to result in coatings with a VOC content of 300 to 400 grams per liter by the year 2000, and 150 to 300 grams per liter by the year 2010. These estimates are based on reformulation technology currently in use or under development in the architectural coating field.

EMISSION REDUCTION

It is estimated that architectural coating operations accounted for approximately 63.8 tons of ROG emissions per day in 1985. Projections for 2000 and 2010 show ROG emissions of 44.0 and 49.7 tons per day, respectively.

Based on past trends in architectural coating reformulation, a 25 percent ROG emission reduction is expected for the architectural coatings category. This measure could achieve reductions of 11 and 12.4 tons per day in years 2000 and 2010, respectively. Emission charges proposed in CM #88-A-8b could potentially provide incentives to achieve further reductions.

COST EFFECTIVENESS

The cost effectiveness of this measure has not been determined, but is expected to be minor since the emission limits proposed are not completely technology-forcing, but follow the trend in current architectural coating development.

OTHER IMPACTS

No adverse environmental or economic impacts are expected as a result of full implementation of this control measure.

7) **CM #88-A-14** **Control of Emissions from Expanding Plastics and Blowing Foam Manufacturing Operation**

PROPOSED METHOD OF CONTROL

Adoption of ordinances by the local governments (e.g. City of Los Angeles) regarding reduction in use or banning of extruded foam products will provide additional emission reductions as foam manufacturing activities will be decreased.

8) **CM #88-A-15*** **Control of Emissions from Semiconductor Manufacturing Operation**

The proposed control measure (Proposed Rule 1164) was adopted July 8, 1988 by the District Board to reduce ROG emissions from semiconductor manufacturing operations. The rule subjects both positive and negative photoresist operations to a 90 percent control of ROG emissions. Improved equipment procedures are required with the option of using either low-VOC solvents or low-vapor pressure solvents. Cleaning stations, already subject to Rule 1122, will be subject to more stringent requirements of greater freeboard ratio or the use of low-vapor pressure solvents. Facilities emitting less than 5 pounds per day of ROG's will be exempted. An alternative emission control plan is provided as an option. The principal cost associated with implementation is the cost of add-on control equipment for photoresist operations. The non-photoresist operations are expected to cost less than $2,000 per ton of ROG reduced. The cost effectiveness of the requirements of Rule 1164 at full implementation is estimated to vary from $5,000 to $22,000 per ton of ROG reduced, depending on the operating conditions of the facility. The average cost for retrofit control for photoresist operations is about $15,000 per ton of ROG controlled. The following table updates the emission inventory and emissions reduction for Rule 1164.

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	1.4	2.0	2.2
ROG Reduction	---	1.8	2.0
ROG Remaining	---	0.2	0.2

9) **CM #88-A-17** **Control of Emissions from Petroleum Solvent Dry Cleaning Operation**

EMISSIONS REDUCTION

Emissions reduction estimates for 2000 and 2010 will be revised to reflect the trend in growth of the petroleum dry cleaning industry, including the switch to perchloroethylene systems. They are listed as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	0.7	1.1	1.2
ROG Reduction	---	0.9	1.0
ROG Remaining	---	0.2	0.2

10) CM #88-A-18 Control of Emissions from Underarm Products

EMISSIONS REDUCTION

An estimate for the underarm products emission inventory is provided based on the latest available data. The emission reduction is also revised, based on complete banning of reactive aerosol propellants and reformulation of solvent bases in all underarm products. Emission trade-offs between aerosol and non-aerosol product use may occur as a result of reformulation or banning of aerosol propellants. The following table summarizes the emissions and reduction data:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	3.4	4.3	5.9
ROG Reduction	---	3.7	5.0
ROG Remaining	---	0.6	0.9

COST EFFECTIVENESS

Additional data made available by the California Air Resources Board indicates that the cost effectiveness is in the range of \$320-\$6220 per ton of ROG reduced.

11) CM #88-A-19 Control of Emissions from Domestic Products

EMISSIONS REDUCTION

A revised estimate for the domestic products (nonunderarm) emission inventory is included based on the latest available data. The emissions reduction is also revised, based on complete banning of reactive aerosol propellants, and reformulation of reactive solvent bases in all domestic products (e.g. personal and household products, automotive industrial, paints and finishes,, insect sprays, food products). The following table summarizes this data:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	96.3	120.3	131.0
ROG Reduction	---	64.8	74.6
ROG Remaining	---	55.5	56.4

12) CM #88-A-21* **Further Emission Reductions from Adhesives**

An asterisk was added to the control measure number as this is an early action measure.

EMISSIONS REDUCTION

A preliminary estimate of emissions from the use of adhesives is currently about 13.6 tons per day. Emission projections for 2000 and 2010 were based on the average growth factor from a number of the surface coating categories employing the use of adhesives. An emission control of about 50 percent is being contemplated based on a minimum transfer efficiency of 65 percent, low solvent reformulation, and closed systems for equipment clean-up operations. The following table summarizes this data:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	13.6	14.6	15.3
ROG Reduction	----	7.3	7.6
ROG Remaining	----	7.3	7.7

13) CM #88-B-2 Control of Emissions From Gasoline Transfer: Improved Installation and Repair of Phase-II Vapor Recovery Systems

PROPOSED METHOD OF CONTROL

The option of eliminating self-service isles would be considered if the proposed vapor recovery device can not achieve the expected reduction.

14) CM #88-B-3 Control of Emissions From Open Sumps, Pits, and Wastewater Separators

PROPOSED METHOD OF CONTROL

Review of additional data indicated that a 90 percent control efficiency is a more realistic assumption for the types of controls which are currently available (in lieu of the proposed 95 percent control efficiency).

EMISSIONS REDUCTION

Based on the 90 percent control efficiency, the emissions reductions are revised as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	2.3	2.4	2.5
ROG Reduction	---	2.2	2.3
ROG Remaining	---	0.2	0.2

15) CM #88-B-11 Control of Emissions From OCS Exploration Development, and Production

PROPOSED METHOD OF CONTROL

A 90 percent control efficiency is required for controlling fugitive ROG emissions from valves, pumps, and compressors. This revision is based on the most stringent control efficiency specified in CM #88-B-13. The overall control efficiency for reducing ROG emissions, in conjunction with electrification, is about 90 to 95 percent.

16) CM #88-B-12 Control of Emissions From Petroleum Refinery Flares

EMISSIONS REDUCTION

The emissions inventory data, recently obtained, indicates that pollutants emitted from refinery flares are less than 0.1 tons per day, except CO being about 0.3 tons per day. Minor increases are expected by the years 2000 and 2010. The District's Engineering Division is currently conducting a study on refinery flares. The emissions inventory and control methods will be updated as soon as the study results become available.

17) CM #88-B-13* Further Emission Reductions From Valves, Pumps, and Compressors Used in Oil and Gas Production Fields, Refineries and Chemical Plants

PROPOSED METHOD OF CONTROL

A 90 percent control efficiency is required where applicable leakless alternatives for valves, pumps, and compressors exist. Otherwise, a 60 percent control efficiency would be required through the Inspection and Maintenance program. Also, based on additional analysis, methane is recommended as the calibration gas because of its greater response factor with the OVA (Organic Vapor Analyzer) as well as being consistent with other districts.

EMISSIONS REDUCTION

The emissions inventory for this measure is revised to include the emissions from natural gas processing plants. The proposed control methods are also applicable to natural gas processing plants which, in fact, are considered as part of the oil and gas production operations for the District permitting purpose. The emissions reductions are also updated to reflect the modification in control efficiency as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	15.5	15.5	15.8
ROG Reduction	----	11.6	11.9
ROG Remaining	----	3.9	3.9

COST EFFECTIVENESS

The control cost for this measure would range from $4,000 to $90,000 per ton of ROG reduced, depending on the types of equipment (e.g., valves or pumps).

18) CM #88-B-15* Control of Emissions From Petroleum Refinery Heaters and Boilers

The proposed control measure was adopted on August 5, 1988 as Amended Rule 1109. Based on the adopted amendment to Rule 1109, a flue gas concentration level of 0.03 pounds of NO_x per million BTU of heat input is required for all units greater than 40 million BTU per hour regardless of fuel type used. The final compliance date is 12/31/95. The associated emissions reductions for the years 2000 and 2010 are expected to be 25.4 and 25.5 tons per day, respectively. The average control cost is about $8,800 per ton of NO_x reduced. The range for individual facilities would vary from $7,100 to $20,000 per ton of NO_x reduced.

19) CM #88-C-2 Control of Emissions From Breweries

The proposed control measure is deleted due to its low emission reduction potential and high control cost.

20) CM #88-C-5 Further Emission Reductions From Unconfined Abrasive Blasting operations

After further evaluation, the proposed control measure is deleted because : (1) The District does not have authority to adopt a more stringent standard than the state standard for abrasive blasting operations (California Health and Safety Code

41904). (2) Enforceability of the proposed requirements for abrasive materials (after blasting) for unconfined operations is questionable and impractical. (3) The high control cost is based on an enclosure and a baghouse which are not practical for these operations.

21) CM #88-C-8* **Control of Emissions From Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters**

Based on the Staff Report for Proposed Rule 1146, dated February 19, 1988, the following sections are updated:

PROPOSED METHOD OF CONTROL

Additional analysis indicated that in order to meet the 40 ppm emission level, most units may have to be retrofitted with flue gas recirculation (FGR) or a combination of FGR, low-NO_x burners and other control techniques such as equipment derating or urea injection. The Selective Catalytic Reduction (SCR) may not be generally feasible because of low exhaust temperature of industrial boilers (below 450^{o}F), cycling (load change resulting in varied exhaust temperature), operation at low capacity, and space requirement for SCR installation.

The recommended compliance schedule for meeting the emission level of 40 ppm (0.05 pounds per million BTU) is 3/1/91 for units rated 10 million BTU/hr or greater and 3/1/92 for smaller units (equal to or greater than 5 million BTU per hour but less than 10 million BTU per hour.

EMISSIONS REDUCTION

NO_x emissions inventory and reductions are updated as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
NO_x Inventory	19.7	22.3	23.8
NO_x Reduction	----	15.2	16.2
NO_x Remaining	----	7.1	7.6

COST EFFECTIVENESS

The average cost effectiveness is estimated to be about \$9,000 per ton of NO_x reduced using FGR technology. The cost effectiveness could reach approximately \$40,000 per ton of NO_x reduced for a large unit that requires FGR and other controls.

22) CM #88-C-9* **Control of Emissions From Stationary Gas Turbines**

Based on the Staff Report for Proposed Rule 1134, dated May 6, 1988, the following sections are updated:

PROPOSED METHOD OF CONTROL

The proposed emission levels and the corresponding compliance schedule are specified below:

The recommended NO_x emission level of 9 ppm for new units rated 0.3 MW or greater and fueled by natural gas, methanol, or oil should be complied with upon installation. For existing units, the recommended NO_x emission levels are as follows:

1. By 30 months after date of adoption:

    (a) 42 ppm for gas/methanol firing and 75 ppm for oil firing for units from 0.3 MW to less than 10.0 MW.

    (b) 9 ppm for units 10.0 MW or larger

2. By 60 months after date of adoption:

    (a) 42 ppm for gas/methanol firing (no oil limit because methanol will be the standby fuel) for units from 0.3 MW to less than 2.9 MW or greater.

New units and units fueled by landfill and digester gas of 0.3 MW or greater must comply with a 9 ppm NO_x limit. Existing units burning landfill gas or digester gas must comply with a 42 ppm NO_x limit 30 months after date of adoption and a 9 ppm limit 60 months after adoption.

EMISSIONS REDUCTION

NO_x emissions inventory and reductions are updated as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
NO_x Inventory	16.8	36.2	36.2
NO_x Reduction	----	26.8	26.8
NO_x Remaining	----	9.4	9.4

COST EFFECTIVENESS

The average cost effectiveness is estimated to be $18,000 per ton of NO_x reduced using SCR technology. The range for individual facilities would vary from $4,000 to $26,000 per ton of NO_x reduced.

23) CM #88-C-10* **Control of Emissions From Electric Power Generating Boilers**

Based on the Staff Report for Proposed Rule 1135, dated May 26, 1988, the following sections are updated:

PROPOSED METHOD OF CONTROL

The proposed control measure is revised to specify the emission level of 0.03 pounds per million BTU of heat input with a final compliance date of July 1, 1992.

COST EFFECTIVENESS

The average cost effectiveness is estimated to be about $42,600 per ton of NO_x reduced. The range for individual facilities varies from $8,000 to $640,000 per ton of NO_x reduced.

24) CM #88-C-11 **Control of Emissions From Afterburners**

The proposed control measure is re-numbered as CM #88-C-5.

EMISSIONS REDUCTION

Based on data recently made available, the NO_x emissions inventory and reductions are included as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
NO_x Inventory	3.0	3.3	3.5
NO_x Reduction	---	2.3	2.5
NO_x Remaining	---	1.0	1.0

25) CM #88-C-12 **Control of Emissions From Non-Utility Internal Combustion Engines**

DESCRIPTION OF SOURCE CATEGORY

Background

The non-utility internal combustion engines subject to this measure include stationary, non-power generating internal combustion engines not used for emergency standby.

EMISSIONS REDUCTION

Since 80 percent of power currently used in the Basin is imported from out-of-Basin, the impact of additional in-basin power plants emissions will be insignificant. Therefore, a 100 percent control efficiency is assumed for this source category.

26) CM #88-D-1 Control of Emissions From Starter Fluid

EMISSIONS REDUCTION

Based on additional data, the NO_x emissions inventory and reductions are included as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
NO_x Inventory	2.0	2.5	2.8
NO_x Reduction	---	1.3	1.4
NO_x Remaining	---	1.2	1.4

27) CM #88-D-2 Application of Solar Panels on Residential Water Heaters

The proposed control measure is deleted due to high control costs.

28) CM #88-D-3 Application of Heat Transfer Modules on Residential Heating Furnaces

The proposed control measure is deleted due to high control costs.

29) CM #88-D-4 Addition of Flue Dampers on Residential Water Heaters

The proposed control measure is deleted due to safety concerns associated with the proposed control method and relatively low emission reductions.

30) **CM #88-D-5 Out-Of-Basin Transport Of Biodegradable Solid Waste**

The proposed control measure is re-numbered as CM #88-D-2 and revised to incorporate resource recovery facilities as follows:

CM #88-D-2

OUT-OF-BASIN TRANSPORT OF BIODEGRADABLE SOLID WASTE
[All Pollutants]

****

SUMMARY

Source Category: *Landfill Gas; Resource Recovery*

Control Methods: *Require All Biodegradable Solid Waste Be Transported Out of the Basin for Disposal*

Emissions: (Tons/Day)	*Year 1985*	*Year 2000*	*Year 2010*
ROG Inventory	*5.6*	*4.9*	*5.3*
ROG Reduction	---	*1.0*	*5.3*
ROG Remaining	---	*3.9*	*0*
NO_x Inventory	---	*22.5*	*22.5*
NO_x Reduction	---	*0*	*22.5*
NO_x Remaining	---	*22.5*	*0*
SO_x Inventory	---	*6.5*	*6.5*
SO_x Reduction	---	*0*	*6.5*
SO_x Remaining	---	*6.5*	*0*
PM Inventory	---	*3.5*	*3.5*
PM Reduction	---	*0*	*3.5*
PM Remaining	---	*3.5*	*0*
CO Inventory	---	*22.7*	*22.7*
CO Reduction	---	*0*	*22.7*
CO Remaining	---	*22.7*	*0*

Control Cost: *Not Determined*

Other Impacts: *Reduced Toxic Emissions Generated in Landfills and Reduced Nuisance Impacts of Landfills to Surrounding Neighborhoods*

****

DESCRIPTION OF SOURCE CATEGORY

Background

Solid waste generated in the Basin has been disposed of by burying in sanitary landfills located in and around the perimeter of the Basin. This method of disposal began in the 1950's when the Los Angeles County Air Pollution Control District banned on-site waste incineration as an air pollution control measure. As the original landfills reached capacity, new landfills were developed. Over the last five years new sanitary landfill capacity within a convenient hauling distance of the sources has been difficult to obtain due to opposition from neighboring citizens. The difficulty in locating new sanitary landfills led to proposals for building centralized solid waste incinerators. Twelve such incinerators in all were proposed but only two projects were able to proceed to construction; the others were abandoned due to strong citizen opposition. A shortfall of available landfill capacity in some parts of the Basin is forecasted by 1991 if no new landfills or landfill expansions are permitted.

Both sanitary landfills and solid waste incinerators are sources of emissions. Landfills generate organic gases as a result of anaerobic decomposition of biodegradable solid waste buried in the landfill; the gas eventually migrates to the surface where it can escape into the atmosphere. Decomposition of buried solid waste occurs over a period of 10 to 20 years. Solid waste incinerators combust all biodegradable solid waste immediately, leaving only an ash inert.

Recently there has been a great deal of discussion on how to handle the solid waste generated in the Basin as existing landfill capacity is exhausted. Source separation, waste minimization, composting, and recycling have been discussed and are being implemented in some localities. These practices will contribute to a reduction in both the amount of emissions from solid waste decomposition and emissions from solid waste transport. Suggestions have been made to transport all solid waste out of the Basin for disposal. Efforts to site both new landfills and site solid waste incinerators are continuing.

Regulatory History

Landfill gas was first recognized as an air pollution source in 1980; Rules 1150.1 and 1150.2 require active and inactive landfills to install systems for collecting and flaring the gas. This rule eliminated most of the organic gas emissions but created landfill gas flaring as a new source of NO_x plus minor amounts of ROG, SO_x and CO. Solid waste incinerators emit ROG, NO_x, SO_x , PM, CO, and some toxic air p ollutants. If any new incinerators are constructed, they will be required to obtain emission offsets, probably consuming a large fraction of the offsets likely to be available.

PROPOSED METHOD OF CONTROL

Of the three solutions to the Basin's solid waste disposal problem (transportation out of the Basin, new landfill sites, and solid waste incineration), only transport out of Basin eliminates solid waste decomposition as a source of emissions. With recycling and source separation, combustible solid waste can be converted to a fuel

which could be marketed for use in electrical power plants outside the Basin. This type of fuel is referred to as refuse derived fuel (RDF). Facilities currently exist outside of California for converting solid waste to RDF.

Transport of RDF out of the Basin could be a major new source of emissions if efforts are not made to take advantage of opportunities for intelligent sitting of RDF conversion facilities. The most economical and lowest emitting means of transport of such a material over any significant distance is by rail. Electrification of rail lines is one of the most cost-effective AQMP control measures. Thus for the purposes of this discussion it is assumed that all such transport is by electrified rail lines resulting no additional emissions from rail transport of RDF. Sitting of RDF conversion facilities adjacent to rail lines can minimize transport emissions. This would eliminate the need to transport RDF by any means other than rail. Further, since the Basin is well served by rail lines in areas zoned for industrial use and these areas are at the center of most urbanization, the ton-miles of transport of solid waste could also be reduced from todays levels.

EMISSIONS REDUCTION

Landfills

Emissions from gas escaping from solid waste landfills increase as population increases assuming that all solid waste is landfilled and per capita solid waste generation remains unchanged. In 1985, ROG emissions from escaping gas was 5.6 tons per day. In the years 2000 and 2010, ROG emissions drop to 2.0 and 2.4 tons per day, respectively, due to existing regulations. Elimination of landfilling would prevent any additional solid waste from beginning the decomposition process in the Basin. All buried solid waste would be allowed to complete the decomposition process over a period of about 15 years until the emissions approach zero.

Other landfill emission sources are dust generated from hillside grading, the exhaust emissions from grading equipment, and the exhaust emissions from flaring and combustion in IC engines. Emissions from these types of sources are included in the emissions inventory but are not able to be separated specifically for landfills.

Resource Recovery Facilities

Emissions from resource recovery facilities were zero in 1985. For the years 2000 and 2010, they are estimated to be: ROG-2.9, NO_x-22.5, SO_x-6.5, PM-3.5, and CO-22.7 tons per day. It is assumed that these facilities would cease operations by 2010.

RDF Conversion Facilities

RDF conversion facilities would be new sources of emissions.

Transport Of Solid Waste and RDF

The emissions required to transport RDF out of the Basin is assumed to be zero through the use of electrified rail lines. The reduction in emissions from transport of solid waste to centrally located RDF conversion facilities instead of landfills is difficult to calculate. In order for RDF to be feasible, extensive source separation would be required. Source separation may be needed to enable recycling to reduce

the overall waste problems of the Basin whether or not RDF conversion is included. With source separation, recycling becomes a major component of the waste disposal system, greatly altering the transport of solid waste in the Basin.

COST EFFECTIVENESS

The cost-effectiveness of this measure can only be determined by comparing this proposal against other long run proposals for handling the solid waste problems of the Basin which do not consider air quality impacts. This proposal may in fact be the lowest cost method of disposing of biodegradable solid wastes generated in the Basin irrespective of any air quality concerns.

OTHER IMPACTS

Landfills generate toxic air pollutants along with criteria air pollutants. This control measure would gradually eliminate landfills as a source of these pollutants.

REFERENCES

South Coast Air Quality Management District. 1986. Hazardous Pollutants in Class II Landfills. Laboratory Services Branch, Technical Services Division. December 1986.

South Coast Air Quality Management District. 1987. Impact Assessment of Waste-to-Energy Projects and Alternatives in the South Coast Air Basin. Planning Division. March 1987.

31) CM #88-D-6 Control of Fugitive Emissions from Publicly Owned Treatment Works

The proposed control measure is re-numbered as CM #88-D-3.

EMISSIONS REDUCTION

Based on additional data, the ROG emissions inventory and reductions are revised as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	0.2	0.3	0.3
ROG Reduction	---	0.1	0.1
ROG Remaining	---	0.2	0.2

32) CM #88-D-7 Control of Emissions From Utility Equipment

The proposed control measure is re-numbered as CM #88-D-4.

PROPOSED METHOD OF CONTROL

Substitution of methanol fuel for gasoline in utility equipment is excluded due to public safety concerns.

EMISSIONS REDUCTION

The emissions inventory and reductions are revised to reflect changes to the proposed control methods as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	13.2	19.1	23.0
ROG Reduction	---	14.1	17.1
ROG Remaining	---	5.0	5.9
CO Inventory	141.1	215.5	264.6
CO Reduction	---	138.5	170.3
CO Remaining	---	77.0	94.3
NO_x Inventory	2.0	3.3*	3.9*
NO_x Reduction	---	0.3	0.6
NO_x Remaining	---	3.0	3.3
SO_x Inventory	0.2	0.3	0.4
SO_x Reduction	---	Minor	Minor
PM Inventory	0.4	0.5	0.6
PM Reduction	---	Minor	Minor

* slight increase in NO_x emissions due to substitution of two-stroke engines with four-stroke designs

A breakdown on emissions for various utility equipment is provided below:

EMISSIONS INVENTORY
(Tons/Day)

	1985			2000			2010		
	CO	NOx	ROG	CO	NOx	ROG	CO	NOx	ROG
Push Mowers	39.0	0.1	4.5	61.2	0.6	6.2	76.0	0.7	7.4
Riding Mowers	10.6	0.1	1.1	16.0	0.2	1.7	19.6	0.2	2.1
Garden Tractors	4.6	0.1	0.5	6.8	0.1	0.8	8.2	0.1	0.9
Rototillers	6.4	0.1	0.7	9.9	0.1	1.1	12.2	0.1	1.3
Mis. Lawn & Garden	5.8	0.1	0.8	8.3	0.1	1.0	9.9	.1	1.3
Chain Saws	1.7	nil	.9	2.3	nil	1.2	2.7	nil	1.4
General Utility	73.0	1.5	4.7	111.0	2.2	7.1	136.0	2.7	8.6
Total	141.1	2.0	13.2	215.5	3.3	19.1	264.6	3.9	23.0

33) CM #88-F-1 Installation Of Best Available Retrofit Control Technology

EMISSIONS REDUCTION

Based on additional data, the emissions inventory and reductions are revised below:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	174.2	182.8	192.8
ROG Reduction	-----	44.1	46.6
ROG Remaining	-----	138.7	146.2
NO_x Inventory	18.9	20.5	23.1
NO_x Reduction	-----	3.8	4.1
NO_x Remaining	-----	16.7	19.0
SO_x Inventory	15.6	17.1	18.0
SO_x Reduction	-----	3.5	3.7
SO_x Remaining	-----	13.6	14.3
PM Inventory	35.0	34.4	39.5
PM Reduction	-----	6.8	7.8
PM Remaining	-----	27.6	31.7
CO Inventory	38.5	46.7	52.7
CO Reduction	-----	8.7	9.8
CO Remaining	-----	38.0	42.9

34) CM #88-F-6 Control of Emissions From Exempt Equipment

This control measure was adopted on June 3, 1988 as Amended Rule 219. The adopted rule eliminates certain exemptions by deleting specific equipment and/or processes from the original list of exemptions, and by decreasing the threshold values for other categories.

35) CM #88-F-7 Control of Emissions From Soil Decontamination

The proposed control measure was adopted on August 5, 1988 as Rule 1166. The adopted rule limits the emission of Volatile Organic Compounds (VOC) from soil contaminated with VOC as a result of leakage from storage or transfer facilities, from accidental spillage, or other deposition.

Based on the adopted amended rule, the owner or operator of an underground tank storing VOC, and a person treating or handling VOC-contaminated soil must notify the Executive Officer at least 24 hours prior to tank excavation or within 24 hours of detection of VOC contaminated soil, and must implement District approved VOC-contaminated soil mitigation measures which result in best available control efficiency. Also, on-site or off-site spreading of VOC contaminated soil which results in uncontrolled evaporation of VOC to the atmosphere is prohibited. The estimated emissions reduction is up to 10 tons of VOC (ROG) per day at a cost of over $18,000 per ton of VOC reduced.

36) **CM #88-F-8* New Source Review**

For the purpose of clarification, the proposed control measure is revised as follows:

CM #88-F-8*

NEW SOURCE REVIEW
[All Pollutants]

****

SUMMARY

Source Category: *All Permitted Sources*

Control Methods: *Set Limits on Emission Increases from All New and Modified Permitted Sources*

Emissions: (Tons/Day)	*Year 1985*	*Year 2000*	*Year 2010*
ROG Inventory	*221.0*	*259.0*	*274.0*
ROG Reduction	----	*21.0**	*44.0**
ROG Remaining	----	*238.0*	
NO_x Inventory	*159.0*	*122.0*	*130.0*
NO_x Reduction	----	*15.0**	*33.0**
NO_x Remaining	----	*107.0*	*97.0*
SO_x Inventory	*40.0*	*42.0*	*44.0*
SO_x Reduction	---	*2.0**	*4.0**
SO_x Remaining	---	*40.0*	*40.0*
PM Inventory	*67.0*	*82.0*	*89.0*
PM Reduction	---	*14.0**	*29.0**
PM Remaining	---	*68.0*	*60.0*
CO Inventory	*58.0*	*76.0*	*82.0*
CO Reduction	---	*10.0**	*21.0**
CO Remaining	---	*66.0*	*61.0*

Control Cost: Not Determined

Other Impacts: *Greater Use of Materials Which May Be Toxic; New Sources May Not Be Able to Locate in the District, Nor May Existing Sources Be Able to Expand Operation*

****

* *See "Emissions Reductions" in text.*

DESCRIPTION OF SOURCE CATEGORY

Background

New equipment and modifications to existing equipment at facilities regulated by the District have the potential to be a significant source of emission increases. To minimize this potential, these sources are subject to New Source Review (NSR). The District's NSR rule has always been directed at larger emission sources to limit emission increases from these sources. Smaller sources have never been subject to a limit on their emissions increases. Even though there has been no increase in emissions from larger sources, there has been an increase in overall emissions because of growth in smaller sources. For instance, the cumulative increase from 1982 through 1986 for ROG from all new and modified equipment was 13.6 tons per day. The intent of the District's NSR regulation was that increases in small sources would be offset by reductions from larger sources. This has not been accomplished under the present NSR rule.

Regulatory History

Regulation XIII is the District's current NSR regulation, and it specifically defines emissions threshold limits, which are shown in Table I. New or modified sources whose net cumulative emissions increase are above these limits must offset these emissions. This can be done by one or more of the following ways: (1) by reducing emissions on other equipment at the site of the new source (e.g., equipment modification); (2) by reducing emissions at another facility owned and operated by the same company or finding an outside emissions source and securing its emission reductions; and (3) by obtaining emissions credits through the emissions credit banking system.

Table I
Emission Threshold Limits

	(lbs/day)
CO	550
SO_2	150
NO_x	100
ROG	75
PM	150
Lead Compounds	3

PROPOSED METHOD OF CONTROL

This measure eliminates the threshold limits and the "free market" offset system described above. Rather, all emission increases will be mitigated by allotments obtained from the New Source Siting Allowance (NSSA).

The NSSA will be administered by the District. It will be funded by emission reductions (mostly occurring as a result of shutdowns) in excess of those reductions required to reach Board established annual clean air targets with an ultimate goal of achieving all air quality standards. Separate allocations will be established within the NSSA for different source categories: 1) Priority sources such as essential public services; 2) New sources; 3) Modified sources; 4) Intermittent sources. The allotments will be distributed to the sources on a quarterly basis.

Sources unable to obtain access to NSSA allotments may still obtain offsets through innovative emission reduction controls. These reductions can occur at some stationary source other than the source where offsets are required.

EMISSIONS REDUCTION

The emission reductions for this measure will depend on the clean air targets set by the Board. The emission reductions shown in the summary table are only from mitigation of all emissions increases from new and modified sources due to forecasted growth.

COST EFFECTIVENESS

The cost effectiveness of implementing proposed control measure is uncertain at this time and requires further analysis.

OTHER IMPACTS

Implementation of this measure will result in greater use of materials which do not lead to emissions of criteria air contaminants but which may not be as safe, or may be toxic.

New sources may not be able to locate in the District and existing sources may not be able to expand operations.

37) CM #88-F-10 Phase-Out Stationary Source Fuel Oil and Solid Fossil Fuel Use

PROPOSED METHOD OF CONTROL

Based on the recommendation to the District Board, a three year phase-out schedule is specified, starting in 1992 with an annual 33 percent elimination of liquid and solid fuel use. However, this phase-out schedule should not be implemented if methanol price is higher than fuel oil price.

EMISSIONS REDUCTION

The emissions reductions for the years 2000 and 2010 are provided based on substitution of methanol for fuel oil and an overall control efficiency of 60 percent as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
NO_x Inventory	22.0	27.6	30.2
NO_x Reduction	---	16.6	18.1
NO_x Remaining	---	11.0	12.1
PM Inventory	1.7	2.6	2.8
PM Reduction	---	1.6	1.7
PM Remaining	---	1.0	1.1
SO_x Inventory	10.8	15.9	16.0
SO_x Reduction	---	9.5	9.6
SO_x Remaining	---	6.4	6.4

COST EFFECTIVENESS

The cost effectiveness for this measure is updated based on the price of methanol as follows:

$18,900 to $32,300 per ton of NO_x (@ $0.35 to $0.45 per gallon)

$18,900 to $65,700 per ton of NO_x (@ $0.35 to $0.70 per gallon)

38) CM #88-G-1 Urban Bus System Electrification

EMISSIONS REDUCTION

An estimate for the urban bus system electrification emission inventory and emissions reduction will be included as a result of newly obtained emission data.

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	1.5	2.3	3.0
ROG Reduction	---	0.7	1.0
ROG Remaining	---	1.6	2.0
NO_x Inventory	9.3	14.0	18.7
NO_x Reduction	---	4.7	6.2
NO_x Remaining	---	9.3	12.5
PM Inventory	1.3	2.0	2.6
PM Reduction	---	0.7	0.9
PM Remaining	---	1.3	1.7
CO Inventory	4.7	7.1	9.5
CO Reduction	---	1.6	2.1
CO Remaining	---	5.5	7.4

39) CM #88-G-3 Use of Radial Tires on Light Duty Passenger Vehicles

EMISSIONS REDUCTION

The PM emissions inventory is revised based on the latest available data. Revised estimates for emissions reduction are also based on the latest available data. Them following table summarizes the changes as follows:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	38.6	51.7	60.5
ROG Reduction	---	2.9	3.4
ROG Remaining	---	48.8	57.1

40) This is a new control measure and will appear as District Proposed Contingency Measure T-1 in the 1988 Draft AQMP Revision as follows:

CM #88-T-1 (New Measure)

EMISSIONS CHARGES ON GASOLINE AND DIESEL FUELS USED BY MOTOR VEHICLES [ROG, CO, NO_x, and PM]

****

SUMMARY

Source Category: Gasoline and Diesel in Mobile Sources

Control Methods: Emission Charges on Gasoline and Diesel

Emissions: (Tons/Day)	*Year 1985*	*Year 2000*	*Year 2010*
ROG Inventory	577.6	256.9	326.1
ROG Reduction	----	*	*
CO Inventory	4,751.3	3,005.7	3,938.2
CO Reduction	----	*	*
NO_x Inventory	619.0	477.0	570.3
NO_x Reduction	----	*	*
PM Inventory	84.2	95.6	111.2
PM Reduction	----	*	*

Control Cost: *Not Determined*

Other Impacts:Exposure to Combustion By-Products

****

* See "Emissions Reduction" in text.

DESCRIPTION OF SOURCE CATEGORY

Background

In January, 1988, the SCAQMD Board adopted a 5-year clean fuels program. Among other things, several measures, pending the attainment of legislative authority, were proposed to provide funding for the program and facilitate the use of clean fuels. These measures include increasing emission fees from stationary sources, adding $1.00 to the motor vehicle registration fee, requiring vehicle smog certification every other year, and requiring the CPUC to allow pass-through of incremental fuel costs.

The clean fuels program calls for the use of clean fuels for stationary and mobile sources. According to the 1985 emission inventory, 53 percent of ROG emissions, 96 percent of CO emissions, and 73 percent of NO_x emissions in the SCAB come from mobile sources. Therefore, substitution of clean fuels for gasoline and diesel in cars and trucks will significantly reduce the contribution of emissions from mobile sources.

One option to promote the use of clean fuels in vehicles is to levy a fee on the use of gasoline and diesel fuels. Clean fuels include compressed natural gas (CNG), hydrogen, liquified natural gas (LNG), liquified petroleum gas (LPG), methane, methanol (M85), natural gas (NG), and propane. An emission charge on gasoline and diesel fuels will provide additional funding support for the clean fuel program. The resulting higher price of gasoline and diesel may also encourage commuters to carpool or ride buses.

Regulatory History

In January, 1988, the Board adopted a 5-year, $30.4 million clean fuels program to promote the development, assessment, and utilization of cleaner fuels. Although a major portion of the program is involved with the stationary source use of clean fuels, a number of demonstration projects are for electric, compressed natural gas, and methanol vehicles.

Proposed Rule 1601 will require a certain percentage of fleet vehicles to be converted to clean fuels. This rule will be ready for adoption in early 1989.

Currently, the District does not have the authority to levy emission charges as an economic incentive system to improve air quality. Therefore, implementation of the proposed control measure will depend on attainment of the authority to use emission charges.

PROPOSED METHOD OF CONTROL

Commercialization of clean fuel vehicles alone may not encourage consumers to switch to clean fuels. Disparity of fuel costs could prevent substitution of clean fuels. An emission charge on gasoline and diesel fuels would reduce fuel cost disparity and therefore offer an economic incentive to consumers to switch to clean fuels. Various methodologies can be used to calculate the charge rate. They include:

Fuel Price Parity

Among all fuels, diesel has the best mileage, followed by gasoline, and clean fuels. Therefore, it will take more clean fuels to reach the distance which diesel and gasoline can. The difference between prices of equivalent gallons of clean fuels and those of gasoline and diesel in terms of the same amount of energy produced can thus be used to calculate the charge rate.

For example, it requires 1.75 times and 2.2 times as much methanol to reach the same distance as gasoline and diesel, respectively. The prices of methanol and gasoline in early 1990s are forecast to be $0.69 and $1.18 per gallon, respectively (CEC). For the same distance, methanol users will pay $0.03 more. Therefore, to encourage consumers to switch to methanol, a minimum charge of $0.03 could be placed on each gallon of gasoline sold. Actual cost figures may vary.

Capital and Maintenance Costs of Vehicles

Utilization of clean fuels needs to be supported by vehicles which can operate on these fuels. The price of these manufactured vehicles will vary by the production volume. For fleet vehicles, the cost of converting a gasoline engine to LPG or CNG is \$800-\$1700 and \$1500-\$2300, respectively (WLGA). Aside from the one-time vehicle purchase or retrofitting cost, operation and maintenance costs during the lifetime of a vehicle will play an important factor in the selection of clean fuel vs. gasoline or diesel vehicles.

Strictly speaking, the cost-effectiveness of a clean fuel is the additional cost of purchasing a clean fuel vehicle as well as its additional operation and maintenance costs (including fuel costs) per unit of emission reductions. This cost-effectiveness can then be translated into a minimum charge rate on gasoline or diesel to promote the use of clean fuels.

Benefits of Clean Fuels

Substitution of clean fuels will reduce population exposure to unhealthy air. Substitution of methanol for gasoline is expected to cut ozone and reduce exposure to benzene (a known carcinogen), and that for diesel could reduce NO_x and PM emissions. The use of natural gas would reduce ROG, PM, CO, and NO_x emissions. Substitution of clean fuels can result in exhaust emission reductions, resulting in a reduction in basin population health-related damage. The health benefits realized through conversion to clean fuels is roughly equivalent to the health damage caused by basin wide emissions from gasoline and diesel fuel. The emission charge can thus be set at the health benefit of emission reductions resulting from one fewer gallon of gasoline or diesel sold.

The District has initiated a major study to determine the health benefits from improvement in air quality. The results from this study (scheduled for completion in mid-1989) will provide information for calculating emission charges on gasoline and diesel fuels.

Large Scale Use of Clean Fuels

The 1988 AQMP Policy Proposals call for the conversion of passenger vehicles and freight vehicles to operate on clean fuels. Such large scale use of clean fuels requires expansion of the supply system, including distribution and retail outlets. Construction of these facilities is very expensive. According to a study prepared for the California Methanol Task Force, expanding the current distribution system of methanol (fewer than 500,000 gallons a year) in the SCAB to 50 million gallons a year will require capital costs of \$1.2-\$9 million. This amounts to a 3 percent penetration to the gasoline and diesel market. This estimate is calculated by converting the gallon difference between the expanded system and the current system in methanol to a combined gasoline-and-diesel equivalent gallons, which is then compared to the 1985 gasoline and diesel usage in vehicles. The capital cost of

expanding the current system to 250 million gallons a year is \$5.13-\$26.88 million with a 15 percent penetration to the gasoline and diesel market. Higher capital costs are anticipated to include other clean fuels.

The emission charge can therefore be indexed to the projected money required for building clean-fuel infrastructure. Using the high projections for methanol infrastructure costs and the 1985 gasoline and diesel usage in the Basin, charges of \$0.006 and \$0.002 per gallon of gasoline and diesel are necessary to support a 250-million-gallon and 50-million-gallon of methanol supply.

Use of Money

As stated earlier, the purpose of an emission charge on gasoline and diesel is to encourage consumers to use clean fuels in their vehicles. The money thus collected can be used to finance clean-fuel infrastructure to strengthen clean fuels' competitiveness with gasoline and diesel. Because clean-fuel-operated vehicles and clean fuels are complementary to each other, extra money collected can also be used to subsidize the production of clean-fuel vehicles to make them more affordable.

EMISSIONS REDUCTION

Mobile sources constitute the largest single emissions category in the Basin. Most of the emissions in this category come from on-road vehicles--mainly light-duty passenger cars and light-, medium-, and heavy-duty trucks. These vehicles use either gasoline or diesel fuel. In 1985, 45.7 percent of daily ROG emissions, 87 percent of daily CO emissions, 59.4 percent of daily NO_x emissions, and 5.1 percent of daily particulate matter (PM) emissions were attributed to these vehicles.

Daily diesel and gasoline consumption in the Basin in 1985 was 1,440,140 and 12,033,083 gallons respectively. Average emissions per gallon of fuel consumption are shown below:

Average Diesel and Gasoline Emission

	Pounds/Gallon Diesel	Gasoline
ROG	0.033	0.091
CO	0.104	0.773
NO_x	0.198	0.079
PM	0.038	0.009

A gallon of diesel has more NO_x and PM emissions while a gallon of gasoline has more ROG and CO emissions.

Studies have shown that clean fuels such as methanol, compressed natural gas, and liquid petroleum gas will result in fewer emissions than gasoline (CCEEB and

WLGA). Although methanol may not achieve significant overall emission reductions it is less reactive and thus contributes less ozone formation than gasoline and diesel. Substitution of methanol for gasoline in vehicles could lower ozone levels by 20-50 percent (EPA). Various tests have shown that conversion of gasoline- or diesel- vehicles to natural gas would reduce 24-85 percent of ROG emissions, 50percent of PM emissions, 25-99 percent of CO emissions, and 12-65 percent of NO_x emissions. Substantial emission reductions are also expected through the use of LPG in retrofitted gasoline vehicles.

Emission charges on gasoline and diesel may encourage commuters to switch to other transportation mode, such as public transit and carpool, to avoid or reduce the payment of such charges. Thus, emission reductions will come from both the use of clean fuels and the increased vehicle occupancy.

COST EFFECTIVENESS

Switching to clean fuels may incur additional costs spent on a clean fuel vehicle or on retrofitting a gasoline- or diesel-powered vehicle. However, lower maintenance costs on clean fuel vehicles may offset some of the initial capital outlay on these vehicles.

OTHER IMPACTS

Formaldehyde--a methanol combustion by-product--is a toxic substance. Widespread use of methanol as a vehicle fuel could result in increased exposure of the public to formaldehyde.

REFERENCES

CCEEB. 1987. Alternative Fuels as an Air Quality Improvement Strategy. California Council for Environmental & Economic Balance (CCEEB), 1987.

U.S. Department of Energy. 1988. Assessment of Costs and Benefits of Flexible and Alternative Fuel Use in the U. S. Transportation Sector, U. S. Department of Energy, January, 1988.

California Energy Commission. 1985. The 1985 California Energy Plan: Fifth Biennial Report, State of California, 1985.

California Methanol Task Force. 1987. The Distribution and Retailing of Fuel Methanol in the South Coast Air Basin. Prepared by Energy and Environmental Analysis, Inc., 1987.

California Energy Commission. 1987. Fuels Report. November, 1987.

Western Liquid Gas Association (WLGA). 1988. Liquified Petroleum Gas as an Alternative Transportation Fuel. June, 1988.

South Coast Air Quality Management District, 1988. Preliminary Draft Staff Report for the Rule 1601 Advisory Committee. June 3, 1988.

Air Resources Board, California Energy Commission, and South Coast Air Quality Management District. 1986. Report of the Three-Agency Methanol Task Force, Volume I - Executive Summary. May 1986.

41) A description of the on-going District smoking vehicle programs will be provided in the Draft 1988 AQMP Revision as control measure CM #88-G-5 as follows:

CM #88-G-5

SMOKING VEHICLE ENFORCEMENT PROGRAMS
[ROG, NO_x, PM]

****

SUMMARY

Source Category:	*All on Road Vehicles*
Control Methods:	*Step-up Enforcement of Smoking Vehicles by a Public Complaint Program, SCAQMD - CHP Smoking Vehicle Program, and SCAQMD Smoking Bus Program.*
Emissions:	*Not Determined*
Control Cost:	*Not Determined*
Other Impacts:	*Possible Fuel Economy Improvement*

****

DESCRIPTION OF SOURCE CATEGORY

Background

The District has recently (post January, 1988) adopted three smoking vehicle programs: the citizen complaint program where a toll-free phone is available for citizens to report smoking vehicles; the SCAQMD - CHP smoking vehicle program where CHP officers patrol for smoking vehicles and issue citations and warnings; and the SCAQMD smoking bus program.

Regulatory History

The vehicle patrol started in May, 1955 in the Los Angeles Air Pollution Control District. The program used uniformed district staff in Los Angeles County to pull over vehicles and cite violators of the vehicle code sections for excessive emissions. The program was deactivated in December, 1968, reactivated in November, 1970, and deactivated again in 1975 due to budget cutbacks.

PROPOSED METHOD OF CONTROL

Citizen Complaint Program

To start the citizen complaint program , the District made it's regular toll-free complaint line available for citizens wanting to report smoking vehicles. Staff developed a special report form to record vehicle complaint information which has

been used by District employees and Board members. During April, 1988, citizens called in 331 smoking vehicle complaints. This represented a fifty percent increase in total air pollution complainants received by the District.

After sorting and verifying the complaint information for accuracy, staff members were able to follow-up seventy-five percent of the complaints with letters sent to the registered owners. Staff members have also received positive comments from several owners receiving letters.

The District has obtained a special toll-free phone number for smoking vehicle complaints; 1-800-CUT-SMOG. This number will make it even easier for citizens to report smoking vehicles.

SCAQMD - CHP Smoking Vehicle Program

The fiscal 1988-89 District Budget included $725,000 for a contract with the CHP for a demonstration smoking vehicle program. The demonstration program is scheduled from July 1, 1988 to June 30, 1989.

This program has expanded the smoking vehicle enforcement to all four counties in the Basin. The operational plan calls for the selection of eight designated CHP officers who will receive specialized District training. These officers will be deployed throughout the counties patrolling in specially marked cars which readily identity the smoke enforcement activity.

Under the terms of the contract, the District and CHP will develop the most efficient deployment strategies for patrolling. The District is receiving monthly reports in the form and manner prescribed by the District. Regular meetings will be held to review program effectiveness and periodic progress reports will be made to the Board.

Smoking-Bus Program

In the period from the start of the smoking-bus program in mid-March, 1988, to mid-July, 1988, there have been over 7,000 observations of buses made by District inspectors. Over 200 of these observations exceeded the 10 second, number one Ringlemann violation criteria of Vehicle Code Section 27153.5. Another 1100 of those observations exceeded the excessive emissions criteria of Section 27153. The District, as of July, 1988, is expending approximately 40 hours per week on this program.

The violating buses are now being pointed out to the companies involved and they are being required to perform the repairs necessary to bring the buses in to compliance. Follow-ups will be done to assure corrections are made. Complaints seeking penalties will be filed by the District in court for those companies or agencies which do not take appropriate and prompt maintenance action.

EMISSION REDUCTION

A poorly maintained engine can produce 100 times the pollution of a new, well-maintained engine. EPA estimates as much as 8 percent of urban non-smoker lung cancer risks in the US result from visible soot from smoking diesel trucks, buses and passenger cars. Proper adjustment of engine components can reduce smoke and soot by 20 to 40 percent.

COST EFFECTIVENESS

The cost impact associated with this measure varies due to the variation in control methods. The cost effectiveness of the control options is uncertain due to unknown emissions reduction potential.

OTHER IMPACTS

A properly tuned engine pollutes less and also improves fuel economy.

42) CM #88-H-1 Disincentives For Idling At Drive-Through Facilities

The proposed control measure is re-named as "Banning of New Drive-Through Facilities".

PROPOSED METHOD OF CONTROL

The proposed control method is revised to include only the banning of new construction of drive-through facilities rather than restrictions on design, location, or construction of existing facilities.

43) CM #88-H-2 Control of Vehicle Registration

This proposed control measure has been moved to the Contingency Measures Group and has been renumbered as District Proposed Contingency Measure T-2.

44) This is a new control measure and will appear as District Proposed Contingency Measure T-3 in the 1988 Draft AQMP Revision as follows:

CM #88-T-3 (New Measure)

EMISSION CHARGES ON PARKING LOTS [ROG, NO_x, CO]

****

<u>*SUMMARY*</u>

Source Category:	*Parking Lots*
Control Methods:	*Emission Charges for Commuters*
Emissions:	**(See Emissions Reduction Section)*
Control Costs:	*Not Determined*
Other Impacts:	*Increased District Staffing*

****

DESCRIPTION OF SOURCE CATEGORY

<u>Background</u>

Indirect sources are facilities, buildings, structures, or installations which attract vehicle traffic. Although they do not "produce" emissions, in the sense that stationary sources emit pollutants, indirect sources pollute by encouraging people to travel. Although there is no way to accurately account for all indirect source emissions, a rough estimate of ROG, NO_X, and CO emissions from indirect sources is approximately 352, 292, and 2703 tons per day respectively. One method of reducing indirect source emissions is through modification of travel behavior. Emission charges can be used as an economic incentive to modify travel behavior and reduce emissions.

<u>Regulatory History</u>

Parking lots have not been subject to regulation by the District based on the number of passengers per vehicle.

PROPOSED METHOD OF CONTROL

The Los Angeles Central Business District Employer - Employee Baseline Travel Survey (Baseline Survey) conducted in June 1986, surveyed over 5,000 employees in 118 companies to gather information on travel conditions and characteristics of downtown office commuters. The survey indicated that drive-alone commuters represent over 59 percent of total office commuters. In 1986, half the drivers to the Los Angeles business district parked free or were fully reimbursed. Subsidized parking in the Los Angeles business district amounts to over $100 million per year

(Simon and Woodhull, 1987). Studies have shown that if drivers have to pay for their own parking, 20 percent or more of drive-alone commuters would be diverted to shared driving or transit (Simon and Woodhull, 1987).
Given such a high level of drive-alone commuters, emission charges on parking facilities could be used as an incentive to seek alternative commuting methods. Employers and owners of facilities attracting or generating 1000 motor vehicle trips per day (500 vehicles in and out) would be responsible for collecting parking charges from drive-alone commuters. Employees and visitors to these facilities who did not carpool or rideshare would have to pay to park (or assessed a charge) as an incentive to rideshare to reduce emissions. If there is already a parking fee at that facility, the parking charges would be in addition to that fee.

Emission charges should be monitored continuously in order to avoid discouraging new employment and business to the area as well as situations in which drivers simply pay to park and continue to commute alone. Due to the delicate nature in setting the correct charge, three scenarios of possible emission charge levels are presented.

Fraction of Average Parking Charges

The Hertz Corporation estimated that the average cost per mile for a new car in 1985 (including fuel costs, insurance, licensing and fees, interest, depreciation, maintenance and repair, but not parking costs) ranged from 54 cents for a subcompact to 83 cents for a standard car in Los Angeles (Smith, 1986). The median round-trip work commute to the Los Angeles business district is 29 miles (Barton-Aschman Associates and Recht Hausrath & Associates). This implies that drive-alone commuters spend from $15.66 - $24.07 on their daily trips to and from work. The cost of parking is an important element in the cost of commuting and is part of the cost.

According to a 1982 Commuter Computer survey, a 50 percent reduction in parking subsidy would reduce drive-alone commuting by 56 percent. An emission charge on parking is just the same as the reduction in parking subsidy. For instance, an emission charge of $2.60 in addition to an average daily parking fee of $10.00 would curb solo-driving by 29 percent. The effectiveness of an emissions charge on parking lots will depend on the magnitude of such charge. This example is for the downtown area, but ultimately parking charges would be assessed throughout the Basin.

The above assumes that employees park at company-owned lots. For employees that park at company subsidized lots, the charge would be factored in by decreasing the amount of the subsidy or just increasing the monthly rate proportionately by the amount of the charge. Facilities collecting parking charges should provide alternative types of transportation such as carpool coordination and vanpools if the parking charge is to be effective. This will made possible with the implementation of Regulation XV.

Survey
In order to set the charge, the District should gather information on local parking rates. This information should be analyzed along with survey information determining the level of the charge required to shift behavior from drive-alone

commuting to ridesharing. Survey information should include: amount an employee is willing to pay to drive alone, amount an employee would accept not to drive alone and rideshare instead, current salary level, vehicle flow in and out of lots, and reasons for commuting alone. The above data would be analyzed to determine a charge that provides an incentive level to rideshare. Vehicle flow in and out of lots will be used to estimate the amount of money that will be collected from the charges. Once the level of the charge is determined, the administrative costs (paying someone to collect the charge, modifications to parking facilities, hiring someone to coordinate ridesharing) would also have to be factored into the charge.

Operating Costs of Lots

According to the study by Simon and Woodhull, surface parking costs between $500 and $1,000 per space to build in downtown Los Angeles. Above ground parking garages cost between $6,000 and $11,000 per space depending upon the construction materials. Operating costs vary from $.66 to $1.50 per space per day. If land costs were zero, the average above ground garage would have to collect $2.50 per day to break even in Los Angeles. Emission charges could be set at a level slightly higher than building and operating costs in an effort to reduce emissions.

The District would be the agency responsible for the actual implementation and enforcement of parking charges. Employers and facility owners would be responsible for collecting the money and turning it into the District. The money collected from these charges could subsidize company ridesharing programs where parking charges are enforced as are other ridesharing programs, and local transportation programs (e.g. mini-buses, shuttles, mass transit).

EMISSIONS REDUCTION

Emission charges can act as an incentive for VMT control and rideshare measures in Tiers I and II to achieve further reductions beyond the 40 percent projected for 2010. Emissions reduction would depend on factors such as the number of vehicles, number of daily trips, and gasoline and diesel usage in gallons.

COST EFFECTIVENESS

Further analysis is required to estimate the cost effectiveness of emission charges on parking lots.

OTHER IMPACTS

One major impact of this measure is the increase in District staff required to monitor and enforce emission charges.

REFERENCES

Barton-Aschman Associates and Recht Hausrath & Associates. 1987. Los Angeles CBD Employee-Employer Baseline Travel Survey-Final Report. April, 1987.

Simon, Jesse A., and Woodhull, Joel. 1987. Parking Subsidization and Travel Mode Choice. Southern California Rapid Transit District. August, 1987.

Smith, L.. 1986. Hertz 1985 20-City Car Study. Press Information Packet. March 24, 1986.

Solis, Rachel. 1988. AMPCO Parking. Personal communication with Lynne Moore, July 1988.

Loman, Mr. 1988. Five Star Parking. Personal communication with Lynne Moore, July, 1988.

45) This is a new control measure and will appear as District Proposed Contingency Measure T-4 in the 1988 Draft AQMP Revision as follows:

CM *88-T-4 (New Measure)

EMISSION CHARGES BASED ON VEHICLE USAGE [ROG, NO_x, CO]

****

SUMMARY

Source Category:	*Light Duty Passenger*
Control Methods:	*Emission Charges Based on VMT*
Emissions:	*(See Emission Reduction Section)
Control Cost:	*Not Determined*
Other Impacts:	*Increased District Staffing*

****

DESCRIPTION OF SOURCE CATEGORY

Background

Indirect sources are facilities, buildings, structures, or installations which attract vehicle traffic. Although they do not "produce" emissions, in the sense that stationary sources emit pollutants, indirect sources pollute by encouraging people to travel. Although there is no way to accurately account for all indirect source emissions, a rough estimate of ROG, NOx, and CO emissions from indirect sources is approximately 352, 292, and 2703 tons per day respectively. One method of reducing indirect source emissions is through modification of travel behavior. Emission charges can be used as an economic incentive to modify travel behavior and reduce emissions.

Emissions from motor vehicles are a large source of pollution. The District's 1985 emission inventory reports over 5.6 million vehicles in use in the Basin with an average of 31 daily vehicle miles traveled per car. The average number of daily vehicle trips is 3.7 per vehicle. This amounts to 398 tons per day of ROG, 328 tons per day of NOx, and 3040 tons per day of CO emissions. Currently, vehicle owners have no incentive for modifying their behavior and driving less or using less polluting transportation. Emission charges based on vehicle usage would provide the proper incentives for vehicle owners to modify their behavior. Emission charges would be assessed along with yearly registration fees over a twelve-month period and collected annually.

Regulatory History

Light duty passenger vehicles have not been subject to regulation by the District based on vehicle usage.

PROPOSED METHOD OF CONTROL

Vehicle owners would receive notice with their registration that they must pay a charge based on the vehicle miles traveled for the last twelve-month period. The charge rate would be in cents/mile based on the number of miles traveled during the year. The charge rate would also be adjusted by a factor based on the year and model of the car. This is necessary since a 1988 model car traveling 10 miles would have less polluting emissions than a 1968 model car traveling the same distance.

For example, ARB exhaust emission rates for light duty passenger cars could be used to adjust the charge rate. These rates are based on emission factors for model years when vehicle emission standards changed. Assuming the average year of a car on the road is a 1983 model, a corresponding average emission factor for NOx is .889. If a person drove 10,000 miles that year, his mileage would be multiplied by .889/100. This would result in a charge of $88.90 for that year. The charge could increase $10.00 a year for the life of the car. Therefore, as a driver's registration fees decrease over the life of the car, their emission charges would increase.

Centers, similar to smog check centers, would be established as official odometer reading stations. Gas stations could also be used as odometer reading stations. These stations would have a chart to calculate the charge based on mileage and type of car. Vehicle owners would then pay the calculated charge and receive a certificate stating the mileage on their odometer and the charge paid. This certificate would then be mailed in with registration fees.

Emission charges based on vehicle miles traveled would encourage car owners to switch to alternative types of transportation. The higher charge rate on an older-model car will expedite the retirement of older polluting cars.

The District would have to work with the State of California DMV and the Legislature to enact such a charge. The District would set the level of the charge and develop the factors based on the year and model of the car. Information would have to be collected on the years and model of cars and the amounts of emissions they produce. This information would then be used to determine the factor c for various types of vehicles.

With this type of charge there is an incentive to "beat the system" and tamper with odometer readings. Therefore, the charges must be low enough so that the incentive to cheat diminishes and high enough to act as an incentive to reduce emissions in some form or another.

The money collected from these charges could subsidize early retirement of older vehicles, alternative types of transportation, and public shuttles.

EMISSIONS REDUCTION

Emission charges can act as an incentive for VMT control and rideshare measures in Tiers I and II to achieve further reductions beyond the 40 percent projected for 2010. Emissions reduction would depend on factors such as the number of vehicles, number of daily trips, and gasoline and diesel usage in gallons.

COST EFFECTIVENESS

Further analysis is required to estimate the cost effectiveness of emission charges on parking lots.

OTHER IMPACTS

One major impact of this measure is the increase in District staff required to monitor and enforce emission charges.

REFERENCE

Air Resources Board. 1988. Exhaust Emission Factors. Mobile Source Division, Inventory Analysis Section. July 1988.

46) The Tier II Goal of Reduction of VMT to 1985 Levels will appear as District Proposed Contingency Measure T-5

47) CM #88-I-4 Control of Emissions from Marine Diesel Operations

EMISSION REDUCTION

This measure will be revised to reflect newly obtained emission data. Marine diesel operations were estimated at emitting 17.4 tons per day of NO_x in 1985. Projections for 2000 and 2010 show NO_x emissions of 20.2 and 21.0 tons per day, respectively.

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	17.4	20.2	21.0
ROG Reduction	----	3.4	3.6
ROG Remaining	----	16.8	17.4

48) CM #88-I-6 Control of Emissions from Pleasure Boats

This measure has removed from Tier I due to lack of definition for the required control technology. Therefore, "Control of Emisions from Pleasure Boats" has been moved to the Tier II control measure group.

49) CM #88-I-7 Control of Emissions from Switching Locomotives

This control measure has been renumbered as CM #88-I-6 and is revised as follows:

EMISSIONS REDUCTION

An estimate for the switching locomotives emission inventory is revised based on the latest available data. The emissions reduction is uncertain depending upon the method of control. The table below summarizes these revisions:

Emissions: (Tons/Day)	Year 1985	Year 2000	Year 2010
ROG Inventory	1.5	2.4	2.9
ROG Reduction	---	Not Determined	
NO_x Inventory	4.5	7.7	8.5
NO_x Reduction	---	Not Determined	
SO_x Inventory	0.5	0.8	0.9
SO_x Reduction	---	Not Determined	
PM Inventory	0.2	0.4	0.5
RM Reduction	---	Not Determined	
CO Inventory	3.4	5.3	6.4
CO Reduction	---	Not Determined	

COST EFFECTIVENESS

The cost impact associated with this measure varies due to the variation in control methods. The cost effectiveness of the control options is uncertain due to unknown emissions reduction potential.

OTHER IMPACTS

A properly tuned engine pollutes less and also improves fuel economy.